Pinnacle West/APS Renewable Program

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Pinnacle West Capital Corporation (the parent company of Arizona Public Service) has been actively involved with renewable energy generation since 1982.

1. PROJECTS

Sky Harbor Airport

This grid- tied system was commissioned in 1982. Early failures of the PV modules rendered this system useless. APS then determined that hardware available on the PV market could not be trusted for utility grade service.

- 225kW Solar
- X20 Concentration
- 2-axis tracking.
- 10 Million dollar lesson

STAR (Solar Test and Research) center. Tempe, AZ

From the bad experience APS had with the airport system, APS constructed and staffed a facility to test solar PV hardware before proceeding with any large purchases.

Carol Springs Mountain, AZ

Constructed for APS in 1996 to serve 8 mountaintop telecom customers. System performed poorly for first 2 years until many issues were resolved.

- 25kW Solar
- 600kWh Energy Storage.
- 30kW 3 phase inverter
- 60kW generator.
- Approximately 80% of load supplied by Solar Resource.

Star Hybrid Test Facility

Constructed by APS in 1997 as a result of the Carol Springs Mountain experience. Constructed to integrate and test high-risk components prior to field deployment.

- 60kW Solar (Various voltage levels)
- 900kWh Energy Storage. (Various voltage levels)
- 50kW 3 phase inverter (Can accommodate up to a 300kW inverter)
- 150kW generator. (Can accommodate up to a 300kW generator)
- 455kW load bank.
- Operates the STAR center buildings as an off-grid load.

Yuma Proving Grounds

Constructed by APS in1998 to serve the Smart Weapons Test Range US ARMY. System tested at STAR prior to field deployment.

- 105kW Solar
- 1.7MWh Energy Storage.
- 150kW 3 phase inverter
- 225kW generator.

Approximately 99% of load supplied by Solar Resource. Generator starts for battery maintenance only with existing load.

San Juanico, Baja California Sur, Mexico

Constructed by CFE /APS in 1999 to serve fishing village of 400 people. (100 residential and commercial customers.) System tested at STAR prior to field deployment.

- 22kW Solar
- 100kW Wind
- 432kWh Energy Storage.
- 90kW 3 phase inverter
- 80kW generator.

Approximately 35% of load supplied by renewable resource Very low 6% capacity factor on wind due to lack of resource.

Dangling Rope, Page, AZ

Constructed in1996 to serve housing facility for 40 people, marina (equipped with a commercial fuel dock sewer pump-out, store, snack bar, and boat repair facility), well, sewer treatment facility, and workshop.

- 160kW Solar
- 2.4MWh Energy Storage.
- 250kW 3 phase inverter
- 2-255kW generator.

Approximately 80% of load supplied by Solar Resource. The National Park Service has been unhappy with performance. Pinnacle West has prepared an action plan to enhance the safety and reliability of this power plant. Power plant equipment was dismantled and brought to STAR for upgrade and testing. Pinnacle West is currently designing a new Hybrid building for this plant.

Pinnacle West is providing consulting services for the Department of Defense, National Park Service, Utah State Office of Energy, Arizona Office of Energy, and other electrical utilities that are considering the construction of

new Hybrid power facilities and/or operating existing Hybrid power facilities.

Grid-Tied Projects

APS currently has over 1MW of solar photovoltaics installed and supplying energy onto the grid. These systems are install throughout the state of Arizona and located in the communities we serve.

- Flagstaff
- STAR
- Tempe
- Gilbert
- Prescott
- Glendale
- 20 Rooftop and parking structure systems.

2. CHALLENGES FOR USING SOLAR AS A UTILITY GENERATION SOURCE:

- High capital cost
- Proposed large solar installations have been met with community resistance.
- Non-Dispatchable ("soft source") generation source.

3. ARIZONA ENVIRONMENTAL PORTFOLIO STANDARD (EPS)

- 1.2% of APS total generation by 2012 shall be renewable.
- The EPS calls to install roughly 100MW of renewable by 2012.
- Intended to by paid for by a surcharge on customer billing.